



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application: : Group Art Unit: 1733  
S. Kobayashi : Examiner: J. T. Haran  
Serial No.: 10/068,400 : IBM Corporation  
Filed: 02/06/2002 : Intellectual Property Law  
Title: BONDING METHOD AND : Department IQ0A/040-3  
APPARATUS : 1701 North Street  
: Endicott, NY 13760

Assistant Commissioner For Patents

Washington, DC 20231

Sir:

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner For Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on 8.31.04

*Georgia Y. Brundege* 8.31.04  
Georgia Y. Brundege Date

Appeal Brief

I. Real Party in Interest

The real party in interest is International Business Machines Corporation.

II. Related Appeals and Interferences

There are no related appeals or interferences.

III. Status of Claims

Claims 1-21 were previously canceled.

Claims 22-41 are pending.

Claims 25, 32 and 39 are appealed.

IV. Status of Amendments

An amendment after Final Action was filed on June 28, 2004 (and received on July 2, 2004), but this Amendment was not entered.

## V. Summary of the Invention

Dependent claim 25 (including base claim 22) recites a method of forming a bonded assembly. An IC chip (21) is positioned adjacent to a substrate (23) with a thermosetting adhesive (24) between the IC chip and the substrate to adhere the IC chip to the substrate. The substrate comprises an epoxy resin reinforced with fiberglass. See Figure 1 and page 8 lines 9-11. The substrate is irradiated with near infrared light toward the IC chip such that some energy of the light is absorbed by the substrate and some energy of the light passes through the substrate to the adhesive to partially cure the adhesive. See page 14 lines 12-25. Claim 25 also recites the step of halting the irradiating step after the adhesive is heated to a predetermined, curing temperature, and after the halting step, cooling the assembly to substantially room temperature and **applying pressure on the IC chip toward the substrate during substantially the entirety of the cooling step**. See page 14 line 24 to page 15 line 6.

## VI. Issues

Claims 25, 32 and 39 were rejected under 35 USC 103(a) in view of Oxman et al in view of Uchiyama et al. (US Patent 5, 847,796). Therefore an issue is whether these claims were obvious in view of Oxman et al. and Uchiyama et al.

Claims 25, 32 and 39 were rejected under 35 USC 103(a) in view of Uchiyama et al, the admitted prior art and Oxman et al. Therefore another issue is whether these claims were obvious in view of Oxman et al., Uchiyama et al. and admitted prior art.

Claim 39 was also objected to under 37 CFR 1.75 as being a substantial duplicate of claim 25. Therefore another issue is whether these two claims are so close as to prevent allowance of both.

## VII. Grouping of Claims

Group I: 25 and 39

Group II: 32

The claims do not all stand or fall together. Rather each group of claims has independent grounds of patentability.

## VIII. Argument

Claims 25, 32 and 39 were rejected under 35 USC §103 based on Oxman et al. in view of Uchiyama et al and in view of admitted prior art.

Appellants respectfully traverse this rejection based on the following.

### Group I

Dependent claim 25 (including base claim 22) recites a method of forming a bonded assembly. An IC chip is positioned adjacent to a substrate with a thermosetting adhesive between the IC chip and the substrate to adhere the IC chip to the substrate. The substrate comprises an epoxy resin reinforced with fiberglass. The substrate is irradiated with near infrared light toward the IC chip such that some energy of the light is absorbed by the substrate and some energy of the light passes through the substrate to the adhesive to partially cure the adhesive. Claim 25 also recites the step of halting the irradiating step after the adhesive is heated to a predetermined, curing temperature, and after the halting step, cooling the assembly to substantially room temperature and **applying pressure on the IC chip toward the substrate**

**during substantially the entirety of the cooling step.** This is described in the specification of the present invention,

“When thermosetting ACF 24 is heated up to a specified temperature, irradiation of near infrared rays 36 is terminated. In the next step, silicon chip 21 and array substrate 23 are pressed together by pressure indirectly applied to silicon chip 21 by pressurizing block 11 (S 105). As understood, substrate 23 is firmly supported by block 15. Thereafter, silicon chip 21, thermosetting ACF 24 and array substrate 23 are cooled to room temperature (S 106). Here, silicon chip 21 and the glass component that constitute array substrate 23 have approximately the same degrees of contraction. Thus, in this cooling process, an unacceptable temperature difference (gradient) between the silicon chip and array substrate is prevented in order to achieve such uniform contraction.” Page 14 line 24 to page 15 line 6.

The Examiner notes that Oxman et al. is silent as to this last feature. “Regarding claims 25, 32 and 39, Oxman et al. is silent towards applying pressure to the chip after the adhesive has been heated to a curing temperature and the irradiation stopped until the assembly has cooled to room temperature.” The Examiner also notes that Uchiyama et al. does not teach this feature either. “It is noted that Uchiyama does not teach applying pressure until the assembly has cured to room temperature” but asserts that “one skilled in the art would have readily appreciated that when the pressure is stopped is a function of a variety of factors and would have appreciated maintaining pressure until the assembly reached room temperature to ensure adequate adhesion and to prevent warpage while cooling.” There is no documentary basis for the Examiner’s assertion.

**Uchiyama et al. teach the removal of the pressure during cooling below 150 degrees C:**

“The bonding conditions include a temperature 220 degrees C, a pressure of 5 gf/mm squared, and a time of 20 seconds. The quality of the light applied and the pressure are set so as to establish these conditions. Then, heating by the light 13 is stopped to decrease the temperature to 150 degrees C under pressure by the bonding tool 4 and **pressing by the bonding tool 4 is then stopped.**” (Emphasis added) Column 14 lines 20-27

Thus, Uchiyama et al. teach that the pressure is maintained only until the temperature drops to 150 degrees C, not during subsequent cooling. In contrast, claim 25 recites that the pressure is applied until the assembly is cooled to substantially room temperature. Therefore, Uchiyama et al. teach away from the present invention, and claim 25 would not have been obvious in view of Uchiyama et al. The admitted prior art of FR-4 as a conventional dielectric material for a substrate or even an LCD does not close the gap. Therefore, the rejection of claim 25 should be reversed.

Claim 39 similarly distinguishes over Oxman et al., Uchiyama et al. and admitted prior art.

## Group II

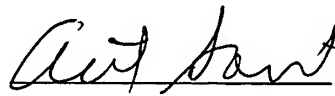
Claim 32 is similar to claim 25 except claim 32 states that “said light passes through said substrate to said adhesive to at least partially cure said adhesive” whereas claim 25 recites “said light passes through said substrate to said adhesive to substantially cure said adhesive”. Therefore, claim 32 distinguishes over Oxman et al., Uchiyama et al. and admitted prior art for the same reasons as does claim 25, and the rejection under 35 USC § 103 should be reversed.

Claims 39 was also objected to under 37 CFR 1.75 as being a substantial duplicate of claims 25. Appellants respectfully traverse this objection based on the following.

Claim 25 recites in part, “irradiating said substrate with near infrared light toward said IC chip such that **some energy of said light** is absorbed by said substrate and **some energy of said light** passes through said substrate to said adhesive to substantially cure said adhesive”. Claim 39 recites in part, “irradiating said substrate with near infrared light toward said IC chip such that **some of said light** is absorbed by said substrate and **some of said light** passes through said substrate to said adhesive to substantially cure said adhesive”.

Based on the foregoing, Applicants request that the rejections of claims 25, 32 and 39 under 35 USC 103 be reversed, and the objection of claim 39 under 37 CFR 1.75 be reversed.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read 'Art Sam', is written over a horizontal line.

Arthur Samodovitz

Reg. No. 31,297

IX. Appendix: Only claims involved in the Appeal

22. A method of forming a bonded assembly, said method comprising the steps of:

positioning an IC chip adjacent to a substrate with a thermosetting adhesive between said IC chip and said substrate to adhere said IC chip to said substrate, said substrate comprising an epoxy resin reinforced with fiberglass; and

irradiating said substrate with near infrared light toward said IC chip such that some energy of said light is absorbed by said substrate and some energy of said light passes through said substrate to said adhesive to substantially cure said adhesive.

25. A method as set forth in claim 22 further comprising the step of halting the irradiating step after said adhesive is heated to a predetermined, curing temperature, and after the halting step, cooling said assembly to substantially room temperature and applying pressure on said IC chip toward said substrate during substantially the entirety of said cooling step.

29. A method of forming a bonded assembly, said method comprising the steps of:

positioning an IC chip adjacent to a substrate with a thermosetting adhesive between said IC chip and said substrate to adhere said IC chip to said substrate, said substrate comprising an epoxy resin reinforced with fiberglass; and

irradiating said substrate with near infrared light toward said IC chip such that some energy of said light is absorbed by said substrate and some energy of said light passes through said substrate to said adhesive to at least partially cure said adhesive.

32. A method as set forth in claim 29 further comprising the step of halting the irradiating step after said adhesive is heated to a predetermined, curing temperature, and after the halting step, cooling said assembly to substantially room temperature and applying pressure on said IC chip toward said substrate during substantially the entirety of said cooling step.

36. A method of forming a bonded assembly, said method comprising the steps of:

positioning an IC chip adjacent to a substrate with a thermosetting adhesive between said IC chip and said substrate to adhere said IC chip to said substrate, said substrate comprising an epoxy resin reinforced with fiberglass; and

irradiating said substrate with near infrared light toward said IC chip such that some of said light is absorbed by said substrate and some of said light passes through said substrate to said adhesive to substantially cure said adhesive.

39. A method as set forth in claim 36 further comprising the step of halting the irradiating step after said adhesive is heated to a predetermined, curing temperature, and after the halting step, cooling said assembly to substantially room temperature and applying pressure on said IC chip toward said substrate during substantially the entirety of said cooling step.



AF / IFW

TRANSMITTAL OF APPEAL BRIEF (Large Entity)

Docket No.  
JP920000346US1

In Re Application Of: S. Kobayashi

SEP 02 2004

Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
10/068,400	02/06/02	J. T. Haran	26502	1733	9612

Invention: BONDING METHOD AND APPARATUS

COMMISSIONER FOR PATENTS:

Transmitted herewith in triplicate is the Appeal Brief in this application, with respect to the Notice of Appeal filed on

The fee for filing this Appeal Brief is: \$330.00

- ☐ A check in the amount of the fee is enclosed.
- ☐ The Director has already been authorized to charge fees in this application to a Deposit Account.
- ☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. 09-0457

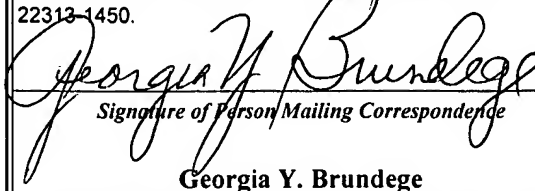
  
Signature

Dated:

08/31/04

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Georgia Y. Brundege

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cc: RECORDS